

Prevalence of Undernutrition in Children Admitted to Pediatrics Hospital at Diyala Province

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Abstract

Background: Nutritional support is an essential aspect of the clinical management of children admitted to hospital. The mean length of hospital stay of most children is only a few days, but can be considerably longer in some children with chronic diseases or underlying problems. During their brief stay, attention is mostly focused on the primary medical problem with a little attention given to the child's nutritional status. Really we don't know how much the nutritional problems are prevalent in the hospitalized children in the province & in overall country, so the purpose of this review is to describe the current prevalence of undernutrition in hospitalized children in order to bring an attention & care to that problem.

Patient & method: This is a prospective study, it was done at al- Batool teaching hospital for maternity & children from 1st of September 2011 to 1st of March 2012. All the patients from >1 month to 5 yr had been included; Weight for age & sex was measured for those patients & compared to the international values published by World Health Organization (WHO). Prevalence of underweight malnutrition was calculated & showed, in addition to other characters of the sample.

Results: The total number of the registered children was 410, the number of underweight children was 108 (26.3 %), so the prevalence of underweight was 26.3 %. The malnourished children were 59 (55 %) male & 49 (45 %) female, while most of them (105 (79 %)) were below 2 year of life.

Those malnourished children were classified according to the type of malnutrition into: acute malnutrition (wasting) and chronic malnutrition (stunting), while according to other classification for malnutrition, the sample was divided into two groups, underweight & marasmus. while both of kwashiorkor & marasmic- kwashiorkor were not present in the study because edema was not detected clinically on data collection.

Conclusion: Malnutrition among hospitalized children is worthy of attention, and effective strategies for systematic screening and treatment of malnutrition in pediatrics patients need to be developed and implemented.

Key words: malnutrition, protein-energy malnutrition (PEM), diayla.

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Introduction

Malnutrition is globally the most important risk factor for illness and death, contributing to more than half of deaths in children worldwide; child malnutrition was associated with 54% of deaths in children in

developing countries in 2001.[1] Although children malnutrition declined globally during the 1990s, with the prevalence of underweight children falling from 27 % to 22 %, national levels of malnutrition still vary considerable (0 % in Australia; 49 % in

Afghanistan), the largest decline in the level of child malnutrition was in Asia where underweight levels decreased by one half between 1990 & 2000.[2]

Each form of malnutrition depends on what nutrients are missing in the diet, for how long and at what age. The most basic kind is called protein energy malnutrition (macronutrients), it results from a diet lacking in energy and protein because of a deficit in all major macronutrients, such as carbohydrates, fats and proteins.[3] Marasmus is caused by a lack of protein and energy with sufferers appearing skeletally thin. In extreme cases, it can lead to kwashiorkor, in which malnutrition causes swelling so-called 'moon face. Other forms of malnutrition are less visible - but not less deadly, they are usually the result of vitamins and minerals deficiencies (micronutrients), which can lead to anemia, scurvy, pellagra, beriberi and xerophthalmia and, ultimately, death.[3]

Protein-energy malnutrition (PEM), first described in the 1920s, is observed most frequently in developing countries but has been described with increasing frequency in hospitalized and chronically ill children in the United States.[4]

Nutritional support is an essential aspect of the clinical management of children admitted to hospital.[5] The interest in nutrition assessments has increased considerably over the last decade, as malnutrition has been documented in hospitalized patients,[6] and shown to be associated with an increased prevalence of complications and a high mortality among hospitalized patients.[7] Malnutrition causes a decrease in the cellular and humoral immune response of patients suffering from either acute or chronic disease.[8] The value of the protein energy malnutrition in hospitalized children was reported as varying

between 21% and 80% in proportion with the level of development of the countries.[9,10]

The mean length of hospital stay of most children is only a few days, but can be considerably longer in some children with chronic diseases or underlying problems. During their brief stay, attention is mostly focused on the primary medical problem, there is still little attention given to the child's nutritional status.[11] Pediatricians may believe that they can recognize a malnourished child 'from the end of the bed,' but the fact is that sometimes we get it wrong; the reproducibility in clinical assessment of nutritional status is poor, even among senior pediatricians—especially in the more severely malnourished. Clinical evaluation of nutritional status alone is inadequate for accurate assessment, and anthropometry is essential.[12]

Anthropometric evaluation is very important for early discovery of the patients with high risk for malnutrition. For this reason, it is necessary to measure at least weight and height of the newly hospitalized patients, and to calculate the required anthropometric values.[13]

Aim of the Study

The aim of the study was to estimate the prevalence of underweight malnutrition among children of 5 years old or below at pediatrics hospital at Diayla province and show their characters.

Patient and Method

This is a prospective study, it was done at al- Batool Teaching Hospital for Maternity & Children from 1st of September 2011 to 1st of March 2012. Al- Batool Teaching Hospital is the only specialized hospital for children at Baquba city (center of Diayla province – eastern Iraq), which received the patients from the city itself, in addition to refer to cases from peripheral districts.

Nutritional Assessment

Nutrition in children can be assessed using anthropometry, biochemical indicators (e. g. a decrease in serum albumin level) & clinical signs of malnutrition (e.g. edema, skin & hair changes). The advantage of anthropometry is that the body measurements are sensitive over the full spectrum of malnutrition, whereas biochemical & clinical indicators are useful only when a child is at least moderately malnourished. A disadvantage of anthropometry is its lack of specificity, because changes in body measurements are also sensitive to several other factors such as attitude, stress, and genetic heritage. In children up to age of 5 years, however, the effects of these factors on growth have not reached their full potential, and their effects on anthropometric measurements are negligible compared to the effect of malnutrition.[4] So, we can depend successfully on anthropometric measures to assess malnutrition in the children at or below 5 year old as what was did in many studies in different states.

Anthropometric Measures and its Significance

Common anthropometric indicator of child malnutrition is combination of body measurement & age, the indicators recommended for international use are: height & weight. To assess the level of malnutrition, a child's height & weight are compared with the international reference median value of height-for-age, weight-for-age, & weight-for-height, taking the sex in consideration.^[4]

Since the late 1970s, WHO has been recommending the use of the Z - score (or called standard deviation (SD) scores) classification to distinguish normal child from malnourished one. Z- Score is a statistical term that quantifies the distance from the expected median value. Charts for standard deviation (Z- score) are available &

had been dependant in this study on differentiate the above mentioned growth indicators (weight-for-age, height-for-age, & weight-for-height) for each child in the study into normal or abnormal measures. These charts were published by WHO at April 2006 after conducting the Multicenter Growth Reference Study (MGRS), these charts are available at

www.who.int/childgrowth/mgrs/en/.

The internationally recommended cut- off point for classifying a child as malnourished is a Z- score below -2 SD compared to the international reference median value, while the value below -3SD is generally used to identify severely malnourished children.[4]

Data Collection

All children who were more than 1 month to 5 yr had been included, each patient was taken once a time in spite of many admissions might occur during the study period.

Application of Anthropometric Measures for classification of malnutrition.

Any child had weight-for-age below -2SD compared with the median value for his age & sex was consider having underweight malnutrition, while weight-for-height & height-for-age were applied to the same child to differentiate his malnutrition state into acute or chronic malnutrition, respectively.

So, The following definitions were used in this study:[14]

1. Underweight means a low weight for age. This is a weight below -2 SD of the median for age & sex. It refers to acute and chronic nutritional disorder.
2. Stunting means a low length/height for age. This is a length/height below -2 SD of median for age & sex. It refers to chronic nutritional disorder.
3. Wasting means a low weight for length/ height. Children are below -2 SD of the median weight for length/height for age & sex. It refers to acute nutritional disorder.

Regarding PEM, Wellcome classification was used to classify the sample of underweight children into four categories after calculation of the percentage of the weight from the median value for his age sex

& clinical examination for presence of edema (sacral &/or leg edema), this classification was explained by the following table.[15]

Table (1): Wellcome classification of protein - energy malnutrition.

Edema\ Weight	60 % - 80 % of expected weight	< 60 % expected weight
No edema	Underweight	Marasmus
Edema	Kwashiorkor	Marasmic- kwashiorkor

So the following definitions were applied:

Underweight: those whom weight-for-age was 60 % - 80 % of the median value for age & sex with absence of edema.

Marasmus: those whom weight-for-age was below 60 % of the median value for age & sex with absence of edema.

Kwashiorkor: those whom weight-for-age was 60 %- 80 % of the median value for age & sex with presence of edema.

Marasmic- kwashiorkor: those whom weight-for-age was below 60 % of the median value for age & sex with presence of edema.

Measurements

The patients were weighted by weight scale (it was taken to the nearest 0.1 kg) and the length was measured for children 2 year old or less in supine position on a length board, while for children of more than 2 year old, the height was measured by stadiometer in standing position (approximated to the nearest 0.5 cm). Age of the child was taken from parents; it was calculated precisely by completed months. All these were done by a single well-trained examiner.

Many data for the studied sample of malnutrition had been reviewed with the relative of the patients & mentioned as descriptive results, these include: age, sex, residence, feeding history, & cause of admission.

The statistic was done by using electronic calculator.

Results

Within six months of the study, all patients who admitted to the hospital , including emergency unit, private & general wards, were reviewed, any child of >1month - 5 years old had been registered & his weight was compared to the international median value for his age & sex.

The total number of the registered children was 410, 108 of them were underweight malnourished, so the prevalence of underweight malnutrition was 26.3 %, these were subset into: acute malnutrition (wasting) in 47 child (43.5%) & chronic malnutrition (stunting) in 61 child (56.5 %).

The malnourished patients in this study were 59 male & 49 female & most of them were below 2 years, table (2).

Regarding the residence of malnourished children, 59 child (55 %) were lived in the center of the province, while 49 child (45 %) were from peripheries.

According to the Welcome classification, the sample of malnutrition was divided into two types only: underweight & marasmus, while the other types (kwashiorkor & marasmic- kwashiorkor) were not presented in the study because edema was not detected clinically in any child, table (3).

Most of the children were admitted to the hospital due to infectious diseases: gastroenteritis in 39 (36%), pneumonia in 33 (31%), 29 child (27%) admitted to the hospital with multi diseases (gastroenteritis,

pneumonia, & anemia). Three patients(3 %) were admitted due to anemia & only 3 child (3%) were admitted for nutritional rehabilitation.

Feeding of malnourished children in this study was breast milk in 43 child, followed

by bottle feeding, then mixed breast & bottle feeding, table (4) shows the no & distribution of the type of feeding to the age groups.

Table (2): Characters of malnourished children.

Age\ Sex	Male no. (%)	Female no.(%)	Total no. (%)
Birth- 6 mo	27 (25)	39 (36)	66 (61)
> 6 mo-2 yr	29 (27)	10 (9)	39 (36)
> 2 yr-5 yr	3 (3)	0 (0)	3 (3)
Total	59 (55)	49 (45)	108 (100)

Table (3): Number & percentage of children for each type of malnutrition.

Type\Degree	Marasmus no. (%)	Underweight no. (%)	Total no. (%)
stunting	11 (10.2)	50 (46.3)	61 (56.5)
wasting	9 (8.3)	38 (35.2)	47 (43.5)
Total	20 (18.5)	88 (81.5)	108 (100)

Table (4): type of feeding versus age of malnourished children.

Feeding \Age	Birth- 6mo. no. (%)	> 6 mo– 2 y no. (%)	>2 y - 5 y no. (%)	Total no. (%)
Breast milk	32 (30)	11 (10)	0 (0)	43 (40)
Formula milk	20 (18)	10 (9)	0 (0)	30 (27)
Mixed (breast & formula) feeding	14 (13)	7 (6)	0 (0)	21 (19)
Breast milk + added food	0 (0)	6 (6)	0 (0)	6 (6)
Formula milk + added food	0 (0)	5 (5)	0 (0)	5 (5)
Table food	0 (0)	0 (0)	3 (3)	3 (3)
Total	66 (61)	39 (36)	3 (3)	108 (100)

Discussion

Despite we are in the 21st century, malnutrition is still a problem worldwide, even in the well developed states. However, its prevalence varies from country to another.

In Iraq, malnutrition, especially chronic undernutrition, is a major health problem like other developing countries. Table (5) shows the prevalence of underweight malnutrition in Iraq.

Table (5): Annual prevalence of underweight malnutrition in Iraq as published by WHO.[16]

Rank	Year	Percent
1	1996	23
2	1997- 2002	12.9
3	2004- 2009	7.1

Precise estimation of prevalence of malnutrition in a general population need a special well organized team such as world health organization, its estimation in hospitalized children may be benefit in many aspects, it may serve as baseline for the surveillance of nutritional status in population of the province & in turn in the country as a whole.

In this study, and in accordance with the WHO recommendation, the WHO standards were used as a reference to calculate the prevalence of nutritional status in hospitalized children in Diyala governorate, comparison with the prevalence data from other regions was made only with those who using the same reference (WHO child growth standards) in a similar age group of children (>1 month to 5 years) at hospital.

The prevalence of underweight malnutrition in this study was 26.3%, it was markedly different from that obtained in general population in Iraq by WHO because the study was hospital based study & it well known that one of the most important complication of malnutrition is decreased immunity, hence, the child is more prone for infection, then increasing admission to hospital, on the other hand, some malnourished babies were admitted for nutritional rehabilitation & other complication (anemia).

Up to our knowledge, this is the 1st study in Iraq searching for prevalence of malnutrition in hospitalized children, In other states, most of researchers were caring for underweight prevalence in general population. In one study for nutritional status

of hospitalized children done in Tabriz Pediatrics Hospital, Islamic Republic of Iran, 2008,^[17] they found the prevalence of underweight was 48.6 %, which was too much higher than the result of the current study. In Iran, the prevalence of underweight in general population by at the same year was 1.8 %. In another study for nutritional status of hospitalized patients done at Istanbul University, Istanbul, Turkey, 2009,^[18] the prevalence of underweight was 52.4% & the prevalence of underweight in general population in Turkey was 3.5 %. So in spite that the malnutrition was more prevalent in general population in Iraq at period 2004-2009 than Iran & Turkey, we found the condition is much less in hospitalized children.

Now, any reader of this article will have one question (what was the cause for this disparity !?), the most probable explanation was under- admission of malnourished children to the hospital, we thought the problem might be due to incompliance of the people for medical advises & most of them refuse admission. This was clear from the causes of admission (only 3 child (3%) were admitted for nutritional rehabilitation), on the other hand, unawareness of the medical personnel for criteria of detecting malnutrition & its possible complications complicate the condition & decreasing the admission more.

Nevertheless, 26.3% of hospitalized children with malnutrition is still high enough to enhance a full programmed work for detection & management.

Regarding sex distribution in the current study, It was found 55 % of the malnourished children were male & 45 % were female, The finding of a lower prevalence of underweight malnutrition in girls is consistent with results of many studies did at different states include: Saudi Arabia, Oman, Yemen, Egypt, USA, Brazil, Bangladesh, Nigeria, & Indonesia.^[19] This universal finding is most probably related to the different pattern of growth between boys and girls in this age group, characterized by lower growth chart curves (-2 and -3 SD) for girls for all growth indices resulting in a smaller proportion of girls below the cut offs (-2 SDS or -3 SDS), leading to a lower prevalence for all indicators.^[20]

In the present study, there was no any patient suffering from kwashiorkor & kwashiorkor-like syndrome (marasmic-kwashiorkor), this is similar with what was discovered in 2 studies done at Saudi Arabia.^[21, 22] That study suggests that among hospitalized patients suffering from malnutrition, underweight is the predominant form of malnutrition (80 %) & marasmus in 20 % only.

Acute or chronic malnutrition reduces the number and function of T cells and phagocytic cells and secretory immunoglobulin-A antibody response,^[8] this will increase incidence of infectious diseases in malnourished babies, this was very clear in this study, most of the children were admitted to the hospital due to infectious diseases: gastroenteritis in 39 (36%), pneumonia in 33 (31%), 29 child (27%) admitted to the hospital with mixed problems (gastroenteritis, pneumonia, & anemia).

Conclusion

1- The incidence of malnutrition in the current & other studies would suggest that malnutrition seems consistently present, despite considerable differences in the type of hospital studied &

socioeconomic background of the patients. In this study, underweight malnutrition is moderately prevalent among hospitalized children in Diyala province as compared to other national studies taking the total prevalence of underweight in general population in consideration.

2- The sample of malnourished children was restricted for underweight & marasmus with absence of kwashiorkor & marasmic kwashiorkor; this is a good indicator for improving socio-economic status of the governorate's people.

Recommendation

Malnutrition among hospitalized children is worthy of attention, and effective strategies for systematic screening and treatment of malnutrition in pediatrics patients need to be developed and implemented. All the doctors at the health centers must be a good trainer for nutritional assessment & should be aware of the consequences of malnutrition, or we establish what is called "the clinical dietitian" at the health centers, then referring any child with nutritional state deterioration to a special unit at the hospital for nutritional rehabilitation (which is already available at Al-Batool hospital), In turn it needs to be more activated with a well trained pediatrician for management of malnutrition. At the same time we need for health education of the people through a well-organized program.

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